

**FIBROMYALGIA: ASSOCIATION BETWEEN SPECIFIC  
PSYCHOLOGICAL VARIABLES AND FUNCTIONAL STATUS**

**MARILIZE DU PLESSIS**



Assignment presented in partial fulfilment of the requirements for the degree of Master of Arts  
(Clinical Psychology) at the University of Stellenbosch

Supervisor: Prof. A.T. Möller

December 2005

### **Declaration**

I, the undersigned, hereby declare that the work contained in this assignment is my own original work, and that I have not previously in its entirety or in part submitted it at any university for a degree.

**Marilize du Plessis**

## **Abstract**

This study investigated the association between functional status in fibromyalgia patients and helplessness, self-efficacy, social support and cognitive appraisal. Patients' assessments of their pain and global severity of illness (as rated on a visual analog scale) as well as a physician's rating of global severity, tended to correlate with helplessness and pain-related self-statements. Patients' perceived change in difficulty and satisfaction regarding activities of daily living (measured by means of the Modified Health Assessment Questionnaire) correlated negatively with self-efficacy beliefs and relationship strain, while patients' subjective assessment of their global improvement was related to self-efficacy. The objective rating by a physician of tender points correlated with catastrophizing self-statements and opportunity for confiding.

## **Opsomming**

In hierdie studie is die verband tussen die funksionele status van pasiënte met fibromialgie en die belewing van hulpeloosheid, selfdoeltreffendheid, sosiale ondersteuning en bepaalde kognisies ondersoek. Pasiënte se beoordeling van hulle ervaring van pyn en die globale erns van hulle siekte (soos beoordeel met behulp van 'n visuele analoogskaal), asook die geneesheer se beoordeling van die erns van hulle siekte, het met hulpeloosheid en pynverwante kognisies gekorreleer. Hulle waarneming van die verandering in die uitvoerbaarheid van, en hulle tevredenheid met hulle daaglikse aktiwiteite (gemeet met die Modified Health Assessment Questionnaire) het negatief verband gehou met selfdoeltreffendheid en verhoudingstremmings, terwyl hulle globale beoordeling van die verbetering in hulle siekte met selfdoeltreffendheid gekorreleer het. Die objektiewe assessering deur 'n geneesheer van sensitiewe liggaamsareas het verband getoon met disfunksionele kognisies (katastrofering) en vertroue in ander.



## **Acknowledgements**

**I would like to express my gratitude towards the following people who have assisted and supported me in my research:**

- **PROF ANDRE MÖLLER,**

My supervisor, for his expertise and guidance;

- **PETER KANE,**

For being there, always;

- **GYS DU PLESSIS,**

My Father, for providing and examining the patients used in the study;

- **SUSAN DU PLESSIS,**

My Mother, for her unfailing encouragement and helping me with the questionnaires;

- **ME MARIEANNA LE ROUX,**

For helping with all the statistics;

- **MNR HENRY STEEL,**

For helping with all the statistics;

- **LIEZL VOLSCHENK,**

For always being my friend;

## Contents

1. Literature review	1
1.1 Fibromyalgia Syndrome	1
1.2 Prevalence and Treatment of Fibromyalgia Syndrome	2
1.3 Association between Fibromyalgia and Psychological Variables	4
2. Objective	9
3. Methodology	10
3.1 Participants	10
3.2 Measuring Instruments	10
3.2.1 Functional Status	10
3.2.1.1 Modified Health Assessment Questionnaire (MHAQ)	11
3.2.1.2 Patient Global Subjective Improvement (GSI)	12
3.2.1.3 Visual Analog Scale (VAS)	12
3.2.1.4 Tender point score (TPS)	12
3.2.2 Psychological Variables	13
3.2.2.1 Arthritis Self-Efficacy Scale (SE-Scale)	13
3.2.2.2 Helplessness Subscale of the Rheumatology Attitudes Index	14
3.2.2.3 Quality of Social Support Scale (QSSS)	14
3.2.2.4 Pain-Related Self-Statements Scale (PRSS)	15
3.3 Procedure	15
4. Results	16
5. Discussion	22

## References

### **List of Tables**

Table 1	Pearson Correlations between Functional Status Measures and Helplessness, Self-Efficacy (SE) and Pain-Related Self-Statements (PRSS)	16
Table 2	Pearson Correlations between Functional Status Measures and Scores on the Quality of Social Support Scale (QSSS)	18
Table 3	Pearson Correlations between the Psychological Variables of Helplessness, Self-Efficacy, Quality of Social Support, and Pain-Related Self-Statements	19
Table 4	Pearson Correlations between the Functional Status Measures: VAS Pain, VAS Fatigue, VAS Sleep, VAS Global Severity, VAS GAS, TPS, MHAQ – Difficulty, MHAQ – Satisfaction, MHAQ – Change, and GSI	21

## 1. LITERATURE REVIEW

### 1.1 Fibromyalgia Syndrome

Fibromyalgia syndrome (FMS) is a chronic musculoskeletal pain disorder, often classified as a non-articular rheumatologic condition (Turk & Ellis, 2003). The cardinal features of FMS are widespread pain and hypersensitivity to palpitation at specific body locations or tender points in the upper and lower body (Wolfe, et al., 1990). The classification criteria for FMS are based on the American College of Rheumatology multicenter study published in 1990 (Wolfe, et al., 1990). The results of this study suggested two primary distinguishing factors that are specific for FMS: (a) a history of widespread pain of at least 3 months' duration, and (b) report of pain or palpitation in at least 11 of 18 tender point sites throughout the body, especially the back, neck, shoulders, throat, and thighs.

The etiology of FMS remains unclear and speculation regarding the underlying causal mechanisms, and whether these mechanisms are physical or psychological in nature, persists (Turk & Ellis, 2003; Winfield, 1999). According to Nezu, Nezu and Lombardo (2001) FMS can occur reactively (in response to trauma or systemic infection) or insidiously (no known precipitating event). There is also considerable controversy about the extent to which FMS may overlap with psychiatric diagnoses of somatization and depression (Johnson, DeLuca, & Natelson, 1999; Winfield, 1999). At present, FMS is conceptualized in the same way as other chronic disorders, as having both physical and emotional components that affect the quality of life of sufferers (Burckhardt, Clark, & Bennett, 1993).

Patients with FMS typically report functional limitations and psychological dysfunction, including chronic fatigue (78.2%), altered sleep physiology (75.6%), feelings of stiffness (76.2%), headaches (54.3%), irritable bowel disorders (35.7%), and depression and anxiety



(44.9%) (Wolfe, et al., 1990). In an ongoing study of 97 fibromyalgia patients, Turk and Ellis (2003) asked participants which factors were associated with improvement and exacerbation of their symptoms. Fifty-nine to 67% reported increases in physical activity, stress and poor sleep as aggravating factors, whereas resting and relaxing were associated with improvement of symptoms in 51% to 62% of patients.

### 1.2 Prevalence and Treatment of FMS

Fibromyalgia is one of the most common disorders encountered in outpatient rheumatologic clinics (White, Speechley, Harth, & Østbye, 1995). The true prevalence of fibromyalgia is unknown, but it is estimated to affect between 0.66% and 10.50% of the population, with the female-to-male ratio of patients seeking treatment approximately 8 to 1 (Schochat, Croft, & Raspe, 1994; Wolfe, 1993). The natural course seems to be chronic and nonprogressive, with fluctuations in symptom severity. Radiographic and laboratory findings tend to be negative (Turk & Ellis, 2003), but several studies have found abnormal brain metabolism of substances such as serotonin, melatonin and growth hormone in fibromyalgia (Dauvilliers & Touchon, 2003). Recent research by Kaplan, Schmidt and Cronan (2000) reported that FMS has a greater impact on an individual's health status than cancer, osteoarthritis, AIDS, and macular degeneration. A well-known fact and a source of great frustration for clinicians as well as patients are that optimal management of FMS is challenging and with discouraging results. No changes pathognomonic or any known cure for FMS have been found, and comprehensive evidence-based guidelines for treatment have not been reported. The diversity of therapeutic programs and the low efficacy of current therapies reflect this lack of knowledge (Goldenberg, 1993). Tricyclic antidepressants, nonsteroidal anti-inflammatory drugs and muscle relaxants have been the primary focus of clinical trials (Carette, et al., 1994; Goldenberg, Felson, &

Dinerman, 1986; Santadrea, Montrone, Sarzi-Puttni, Boccassini, & Caruso, 1993; Scudds, McCain, Rollman, & Harth, 1989), but the results of these studies are difficult to integrate because of the differences in variables, outcome criteria, and measuring instruments used (White & Harth, 1996). Most of the nonpharmacological treatment studies are unimodal, incorporating physical fitness training, patient education, EMG-biofeedback, cognitive-behaviour therapy, relaxation training and meditation-based stress reduction programs (Buckelew, et al., 1998; Burckhardt, Mannerkorpi, Hedenberg, & Bjelle, 1994; Carette, et al., 1994; Horven Wigers, Stiles, & Vogel, 1996; Keel, Bodoky, Gerhard, & Muller, 1998; Lynch, 2004; Nicassio, Radojevic, et al., 1997; Sarnoch, Adler, & Scholz, 1997). These treatments appear to have some short-term benefits, but the initial positive results are often not maintained (Horven Wigers, et al., 1996).

The literature reveals major limitations regarding treatment outcome studies, e.g., many treatment trials are compromised by short duration and lack of masking. There are at present no medical therapies that have been specifically approved by the US Food and Drug Administration for the management of FMS, and a number of other commonly used FMS therapies, such as trigger point injections, have not been adequately researched (Goldenberg, Burckhardt, & Crofford, 2004). Although there is currently no accepted cure for FMS, some pharmacological and nonpharmacological interventions showed clinical benefit. As FMS is a multifactorial syndrome, it is likely that the best treatment options will encompass multiple interventions. Based on current evidence, a multidisciplinary stepwise program emphasizing education, certain medications, exercise, cognitive psychotherapy, or a combination of these four interventions, should be recommended as the treatment of choice (Goldenberg, Burckhardt, & Crofford, 2004).



### 1.3 Association between Fibromyalgia and Psychological Variables

Numerous studies have investigated the relationship between psychological variables and FMS and other rheumatic diseases. Patients with FMS report a substantially compromised quality of life compared to patients with other rheumatologic and chronic diseases (Burckhardt, et al., 1993). FM pain has been associated with higher levels of depression, greater use of avoidant pain coping strategies, lower quality-of-well-being, and more frequent hospitalizations (Schoenfeld-Smith, Nicassio, Radojevic, & Patterson, 1995). In addition, these patients report significantly more distress, especially life stress or chronic daily hassles, than do patients with rheumatoid arthritis or healthy control subjects (Dailey, et al., 1990; Uvegas, et al., 1990). Several previous studies suggested that psychological distress is central to the pain experience and overall morbidity of fibromyalgia (Winfield, 1999).

From a biopsychosocial or behavioural approach, pain disability is determined not only by underlying pathology, but also by emotional, cognitive and environmental factors (Bradley, 1989). As Winfield (1999) appropriately stated in his article on pain in FMS: ‘‘Nowhere in medicine is Engel’s biopsychosocial model of chronic illness more appropriate than in fibromyalgia.’’ (p. 55) It is widely recognized that different psychological variables and patients’ social circumstances influence the success of treatment, especially in a chronic, multidimensional illness like FMS. However, the relationship between psychological variables and treatment outcome for FMS is poorly understood. Although most studies include some self-report instruments to measure pain severity, other variables such as functional status (e.g., perceived disability) and psychological distress are frequently not included (Turk, Okifuji, Sinclair, & Starz, 1998). A review of the research literature reveals that four psychological variables are frequently associated with FMS: self-efficacy, perceived social support, helplessness and pain-



related cognitions (Buckelew, et al., 1998; Franks, Cronan, & Oliver, 2004; Hallberg & Carlsson, 1998; Nicassio, Radojevic, et al., 1997; Nicassio, Schuman, Radojevic, & Weisman, 1999; Prince, Bernard, & Edsall, 2000; Rudnicki, 2001). These variables and their association with FMS will be discussed next.

a) **Helplessness** refers to a psychological state in which individuals expect that their efforts will be unsuccessful (DeVellis & Callahan, 1993). According to studies of helplessness theory (Peterson, 1982), the state of helplessness in chronic illness may be characterized by (a) motivational deficits (e.g., lack of effort to cope with symptoms), (b) cognitive deficits (e.g., beliefs that a coping response will not reduce the pain), and (c) affective deficits (e.g., increased anxiety and/or depression). Research suggests that helplessness beliefs play a role in augmenting the impact of pain and disability in FMS (Ahles, Khan, Yunus, Spiegel, & Masi, 1991; Nicassio, et al., 1999; Schoenfeld-Smith, et al., 1995). The largely unpredictable nature of FMS symptoms and the absence of scientific knowledge regarding the etiology and treatment of FMS, may contribute to considerable subjective uncertainty, feelings of personal helplessness, passive resignation and other forms of dysfunctional coping behaviour in many patients (Nicassio, et al., 1997). The helplessness construct may be especially important in explaining the high levels of depression and functional impairment that are associated with FMS (Ahles, et al., 1991; Schoenfeld-Smith, et al., 1995).

A study by Nicassio et al. (1999) showed helplessness scores to be significantly higher for FMS patients ( $\underline{M} = 17.93$ ) than scores reported by Tayer, Nicassio, Radojevic and Krall (1996) for systemic lupus erythematosus (SLE) patients ( $\underline{M} = 14.45$ ) with the Rheumatology Attitudes Index (RAI), and by Stein, Wallston, Nicassio and Castner (1988) for rheumatoid arthritis (RA) patients ( $\underline{M} = 15.03$ ) with the Helplessness Subscale of the Arthritis Helplessness Index (AHI).



Nicassio et al. (1997) conducted a treatment outcome study, consisting of education about the nature of FMS, training in progressive relaxation, behavioural goal-setting, and activity pacing to increase functioning. They found significantly lower pain scores in the high helplessness change group at follow-up, compared to the low helplessness change group. There was also a gradual trend in improvement of depression across post-treatment and follow-up for the high helplessness change group, but no improvement for the low helplessness change group. They also found that an improvement in helplessness was associated with a decrease in passive coping strategies in FMS patients. These results suggest that the provision of information and an increased sense of mastery may have contributed to a decrease in helplessness and dysfunctional coping.

b) **Self-efficacy** (SE) refers to beliefs that one can competently cope with a challenging situation or task, and that one has the ability to affect behaviour (Bandura, 1977). For example, it was found that individuals with higher perceived self-efficacy tend to persist with active coping behaviours until successful (Buckelew, et al., 1998). Although self-efficacy is related to other psychological concepts such as locus of control, learned helplessness, and self-esteem, it differs in that it is behaviour-specific. Thus, self-efficacy is measured as a specific state, not a generalised trait (Lorig, Chastam, Ung, Shoor, & Holman, 1989). Self-efficacy is considered an important predictor of pain and disease severity measures in the fibromyalgia population (Buckelew, et al., 1998). For example, higher baseline levels of self-efficacy are associated with less self-reported baseline pain (Buckelew, Murray, Hewett, Johnson, & Huyser, 1995), fewer pain behaviours (Buckelew, et al., 1994), and less impairment on physical activity measures (Buckelew, et al., 1995). Self-efficacy for dealing with FMS pain, as well as with symptoms other than impaired physical functioning, were identified as significant predictors of treatment and/or research protocol adherence in a meditation-based stress reduction treatment intervention



for female fibromyalgia patients (Lynch, 2004). A study by Franks et al. (2004) found larger social support networks for FMS patients to be predictive of greater levels of self-efficacy for dealing with pain. Both the size of the network and satisfaction with social support predicted greater levels of self-efficacy for coping with symptoms. Thus, both the number and the quality of social relationships were important determinants of the belief that the symptoms of FMS can be managed successfully. Higher levels of informational support or feedback predicted lower levels of self-efficacy for functioning with FMS. Individuals who do not believe that they are able to deal with the limitations in function associated with FMS may seek and receive information to help them cope with living with FMS. However, these findings could also indicate that individuals who receive too much instrumental support from friends and family feel as if they are unable to function on their own. A directional relationship could not be established with this cross-sectional design (Franks, et al., 2004).

c) **Social support** refers to specific supportive behaviours on the part of others or to the perceived availability of different forms of support (Goodenow, Reisine, & Grady, 1990). In times of trouble or stress an individual relies on the perception of qualitative support, believing that others are available to help him or her to cope with the particular demands posed by the environment.

Given the demanding and stressful nature of a chronic disabling disease, it could be expected that adjustment and functioning would show a strong relationship to perceived qualitative support (Goodenow, et al., 1990). The demands of family and work and the need for social support exert a serious and significant effect on every dimension of health status in patients suffering from FMS (Reisine, Fifield, Walsh, & Feinn, 2003). The past three decades have seen a rapid growth in research in the area of social support, emphasizing the importance of social support to the



maintenance of health (Lackner, 2000). Recent research has suggested that how, when and why people activate their support networks may differ when long-term chronic stress is involved. Lackner (2000) examined the effects of a chronic illness on the processes of social support. Through 60 qualitative interviews with people who were experiencing multiple sclerosis or fibromyalgia, supportive transactions between participants and their social support networks were explored. It was found that participants were actively engaged in their own social support. They defined what they want in a supportive person and actively sought the type of support that most closely fit their definition. They facilitated support but also constrained people's ability to provide it to them by actively engaging in how that support should be provided.

A cross-sectional study, examining the relationship between social support, coping, and subjective well-being, presented a plausible causal sequence: coping influences subjective well-being via social support. This is only true, however, for coping by awaiting/avoidance. Coping by awaiting/avoidance led to less social support and this decrease in social support influenced subjective well-being negatively (Savelkoul, Post, De Witte, & Van Den Borne, 2000).

In a study by Franks et al. (2004) of FMS patients, larger social support networks were associated with greater levels of self-efficacy for pain and symptom management, while the perceived quality of social support was associated with lower levels of depression, helplessness, mood disturbance, impact of FMS, higher levels of self-efficacy for function and symptom management, as well as with overall psychological well-being. These findings indicate that the quality rather than the available quantity of social support is important in determining effective functional and psychological outcomes in women with FMS. Nicassio, Schuman, Kim, Cordova and Weisman (1997) examined specific psychosocial factors associated with complementary treatment use (exercise, bed rest, vitamins, heat treatment, and spirituality/praying) in



fibromyalgia. They found that quality of social support and pain coping strategies did not predict the use of these complementary treatments.

d) **Cognitive self-statements** regarding environmental events are guided by underlying cognitive schemata. It is well recognized that these cognitive appraisals may play an important role in the perception of pain and the response to treatment interventions (Flor, Behle, & Birbaumer, 1993). Cognitive-behavioural theories suggest that a sense of uncontrollability of one's pain and disability leads to negative mood and maladaptive behaviours (e.g., avoidance), which perpetuate functional limitations as well as emotional and physical distress (Bradley, 1989). A number of studies have demonstrated that cognitive appraisal is indeed related to the degree of disability and the response to treatment in chronic pain patients (e.g. Biedermann, McGhie, Monga, & Shaks, 1987; Brown & Nicassio, 1987; Newton & Barbaree, 1987; Phillips, 1987). Thieme, Turk and Flor (2004) investigated pain-related cognitive self-statements in patients with fibromyalgia in their study of the comorbidity of depression and anxiety in FMS. Their results suggested that FMS is not a homogeneous condition, but shows varying proportions of comorbid anxiety and depression dependent on the psychosocial characteristics (e.g. coping behaviour) of the patients. No other studies of cognitive appraisal and fibromyalgia were found in the literature. However, Flor et al. (1993) concluded that an individual's appraisals of pain as well as his/her ability to cope with it are central in determining how disabled a person becomes or remains.

## 2. OBJECTIVE

A review of the literature revealed that there is currently no clarity on the etiology of FMS. Several researchers consider psychological variables to be associated with the onset and course of FMS. However, there is a need for further research into the relationship between FMS and psychological factors. Consequently, the present study investigates the association between functional status in



FMS patients and particular psychological variables (helplessness, self-efficacy, social support and cognitive appraisal).

### **3. METHODOLOGY**

#### **3.1 Participants**

Participants were recruited from patients of a general medicine practice in Potchefstroom, South Africa, all previously diagnosed with FMS. The diagnosis of FMS was made by the same physician for all patients, using the American College of Rheumatology's criteria (Wolfe, et al., 1990). Since the diagnosis was made, these patients received medication (mainly low doses of tricyclic antidepressants, non-steroidals, and/or analgesics), trigger point injections, and education on FMS, given by individual appointment at regular visits to the physician.

These patients were contacted and invited to participate in the study. Forty-three patients responded and then completed the measuring instruments individually, followed by a medical examination. Patients were excluded if they had been diagnosed with any concomitant rheumatologic conditions such as RA, SLE, Hashimoto's disease, Sjogren's syndrome, or scleroderma, or other serious conditions such as cardiovascular disease, central nervous system disorders, or psychiatric disorders such as psychosis or bipolar mood disorder. Cases of substance abuse or involvement in litigation for disability income were also excluded.

This process resulted in a sample of 31 patients, all female, with a mean age of 44.03 years ( $SD = 12.45$ ). The average duration of FMS since its diagnosis was 4.90 years. To control their FM symptoms, 71.0% of the participants reported use of analgesics, 41.9% reported use of non-steroidals, and 54.8% reported use of low dose tricyclic antidepressants.

#### **3.2 Measuring Instruments**

##### **3.2.1 Functional Status**

In attempting to identify FMS patients who respond to treatment, some researchers have used their own definitions or criteria of clinically significant improvement, e.g., clinical judgement (Jaeschke, Adachi, Guyatt, Keller, & Wong, 1991), the patient's rating of treatment efficacy on improvement (Simms, Felson, & Goldenberg, 1991), or a 50% improvement in various FM symptoms (Carette, et al., 1994). The validity of these criteria has not been tested. A review of the literature revealed that different criteria for determining functional status in FMS are currently in use and that there are not a single set of criteria or procedures which are generally accepted.

In the present study functional status was determined by means of the following scales.

#### 3.2.1.1 Modified Health Assessment Questionnaire (MHAQ)

The MHAQ (Pincus, et al., 1983), an abbreviated version of the Health Assessment Questionnaire (HAQ), is a self-report health status measuring instrument which gives an indication of a patient's satisfaction regarding activities of daily living (ADL) and perceived change in difficulty. The MHAQ has been shown to have comparable reliability and validity to the lengthier HAQ (Fries, Spitz, Kraines, & Holman, 1980), and has been used in numerous fibromyalgia studies (e.g., Reisine, et al., 2003; Wolfe, et al., 1997). The questionnaire includes 8 activities of daily living to which patients have to rate their performance according to degree of (a) difficulty, (b) satisfaction, and (c) change in capacity. Patients respond to these questions firstly by selecting one of four levels of difficulty: without any difficulty = 0, with some difficulty = 1, require assistance = 2, unable to do = 3. The Total Difficulty Score is expressed as the mean score for the 8 activities. To assess Satisfaction or dissatisfaction with his or her capacity to perform the selected 8 activities, patients are asked: "How satisfied are you with your ability to...?" about each of the activities. Response coding scores were "satisfied" = 0 and "dissatisfied" = 1. To assess Change in Difficulty for the identical activities, patients are asked about each of the 8 activities: "Compared to 6 months ago,



how difficult is it NOW (this week) to...?” Response coding scores were “less difficult now” = 0, “no change” = 1, and “more difficult now” = 2 (Pincus, et al., 1983).

#### 3.2.1.2 Patient Global Subjective Improvement (GSI)

The GSI is a subjective rating scale aimed at assessing patients’ perceived improvement. Patients are asked to make a general rating of how they perceive their improvement since they have started treatment by selecting one of 5 alternatives: 1 = deteriorated, 2 = unchanged, 3 = slightly improved, 4 = moderately improved, and 5 = much improved. A higher score indicates greater perceived improvement (Horven Wigers, et al., 1996).

#### 3.2.1.3 Visual Analog Scale (VAS)

The VAS measures the patient’s sensory experience and consists of a 10-cm horizontal line, with 0 = no symptoms and 10 = worst symptoms as end-descriptors. The VAS has been validated as a measure for chronic and experimental pain (Scott & Huskisson, 1976; Price, McGrath, Rafii, & Buckingham, 1983). Five VAS scales were used in the present study. On the day of testing, the average intensity of the three most central fibromyalgia symptoms, pain, disturbed sleep and fatigue (lack of energy), were rated on a patient administered VAS, for the past six months. On a fourth VAS patients had to indicate their perceived global severity. A VAS for physician global assessment (GAS) was completed by the physician after examination of the patient. Although the physician’s severity ratings clearly do not capture the complex picture of disease available in individual records, it is the single “objective” measure of health status that is comparable across all patients. Findings in a study by Bigatti and Cronan (2002) suggest that the easy-to-administer VAS may be the most useful measure of pain in patients with FMS.

#### 3.2.1.4 Tender Point Score (TPS)

A TPS system (Simms, et al., 1991; Nicassio, et al., 1997) was used in which tenderness was assessed by the physician by applying pressure maximally to approximately 4 kg/cm<sup>2</sup> in 9 bilateral anatomically distinct tender points according to the protocol established by Wolfe, et al. (1990): occiput, low cervical, mid-point of the trapezius muscle, supraspinatus origin above the scapula spine near the medial border, second rib at the costochondral junctions, lateral epicondyle, gluteal in upper outer quadrants of buttocks, greater trochanter and the fatpad of the knee over medial collateral ligament. The right and left anatomic sites were considered as one since both were equally tender. The sites were graded as: not tender or mildly tender = 0, moderately tender = 1, and severely tender = 2. A tender point score (TPS) was computed by adding these graded points, rendering a maximum score of 18 (Nicassio, et al., 1997; Simms, et al., 1991).

### 3.2.2 Psychological Variables

The following measuring instruments were used to assess the psychological variables of self-efficacy, helplessness, social support and cognitive appraisal.

#### 3.2.2.1 Arthritis Self-Efficacy Scale

Self-efficacy was assessed by means of the 20-item Arthritis Self-Efficacy Scale developed by Lorig, et al. (1989). The scale was designed to measure a patient's beliefs in his or her ability to perform specific tasks aimed at pain and symptom control and physical functioning. The measure includes 3 subscales: (a) SE for functioning (i.e., performing certain daily activities), (b) SE for pain management, and (c) SE for controlling other arthritis/fibromyalgia symptoms. A higher score indicates more self-efficacy. Reasonable standards were met for both construct and concurrent validity and test-retest reliability. During its development and preliminary testing, a negative high correlation between an increase in perceived SE and a decline in pain was noted (Lorig, et al., 1989). The instrument was also used in numerous studies to assess SE in Fibromyalgia patients (Buckelew,



et al., 1998; Burckhardt, et al., 1994; Franks, et al., 2004; Mueller, Hartmann, Mueller, & Eich, 2003; Lynch, 2004), by replacing the word ‘arthritis’ with ‘fibromyalgia’.

### 3.2.2.2 Helplessness Subscale of the Rheumatology Attitudes Index

The 5-item Helplessness subscale of the Rheumatology Attitudes Index (RAI; DeVellis & Callahan, 1993) was used to assess helplessness beliefs. The Helplessness subscale of the RAI, which is based on the Arthritis Helplessness Inventory (AHI; Nicassio, Wallston, Callahan, Herbert, & Pincus, 1985), evaluates perceptions of helplessness to control symptoms, including pain (e.g., “I would feel helpless if I couldn’t rely on other people for help with my condition”) and disease course (“My condition is controlling my life”). Higher levels of reported helplessness on the AHI were associated with higher levels of difficulty, dissatisfaction and pain in carrying out activities of daily living, as well as the general perception of worsening clinical status (Nicassio, et al., 1985). The Helplessness subscale has shown to possess significant internal consistency and correlated stronger with other measures of clinical outcome than the full length version of the scale (DeVellis & Callahan, 1993).

### 3.2.2.3 Quality of Social Support Scale (QSSS)

The QSSS, normed on a sample of 194 women with RA, assesses subjects’ perceptions of the quality of social support received from “significant others” in several areas (Goodenow, et al., 1990). The 17 items of the QSSS, assessed on a 4-point Likert scale, cover the following dimensions: (a) information and feedback; (b) task assistance; (c) opportunity for confiding; (d) physical affection; (e) affirmation or ego support and (f) relationship strain (reversed scored). A general index of perceived quality of social support is obtained by summing across items, with a range of 17 (no social support) to 68 (complete support in all areas). The study by Goodenow, et al. (1990) showed higher support levels to be associated with fewer declines in the performance of home and family activities. Although the study noted several limitations (e.g., the cross-sectional nature of the design;



the sample of participants in terms of geography and sex), the instrument was used in subsequent studies for Fibromyalgia patients (Nicassio, et al., 1997).

#### 3.2.2.4 Pain-Related Self-Statements Scale (PRSS)

The 18-item PRSS (Flor, et al., 1992) assesses situation-specific cognitions, that may either promote or hinder patients' attempts to cope with their pain. The PRSS has two scales termed 'Catastrophizing' and 'Coping', which were demonstrated to be valid and sensitive to change. The scale proved to be valid and reliable for assessment of cognitive patterns relevant to persons suffering from chronic pain (Flor, et al., 1992; Sarnoch, et al., 1997; Thieme, et al., 2004; ).

### 3.3 Procedure

All 43 patients were contacted, informed about the study and invited by the researcher to participate. Written informed consent was obtained. Patients were then individually assessed in a single session consisting of a medical assessment (about 25 minutes) followed by a psychological assessment (about 35 minutes). The medical assessments were conducted by the same physician, trained in pain medicine. This assessment entails completion of a medical assessment form by the physician on the demographic details of the patient, previous medical history, current medication and symptoms at onset. This information was used to assess for exclusion criteria. Patients were then questioned about their perceived pain, fatigue, sleep and global severity, after which they were asked to rate these four variables on the VAS scales. The physician then gave his rating of the patient on a similar VAS for a physician global assessment score (GAS). A physical examination was then done for tender point location and to determine severity, in order to compute a TPS out of 20. Both self-report indices (VAS; MHAQ) and objective measures (GAS; TPS) of pain severity and functional incapacity were used to distinguish between subjective and functional aspects of the chronic pain problem.



During the second half of the session, patients completed the MHAQ, Helplessness Subscale, Self-Efficacy Scale, QSSS, and PRSS. Each patient was given a booklet consisting of the five different questionnaires to complete, without any time constraints. The researcher was present at all times to answer questions where participants needed verification and help.

#### 4. RESULTS

To determine the relationship between functional status (VAS pain, sleep, fatigue, global severity; physician GAS; TPS; MHAQ and patient GSI) and psychological variables (helplessness, self-efficacy, quality of social support, and pain-related self-statements), Bravais-Pearson correlations were used. The results are shown in Table 1 and Table 2.

Table 1

Pearson Correlations between Functional Status Measures and Helplessness, Self-Efficacy (SE) and Pain-Related Self-Statements (PRSS)

Functional Status Measures	Psychological Variables					
	Helplessness	SE Pain	SE Function	SE Symptom	PRSS Factor1	PRSS Factor 2
VAS Pain	.39*	-.45*	-.25	-.13	.36*	-.21
VAS Fatigue	.10	-.04	-.14	-.11	.34	-.35
VAS Sleep	-.07	-.03	-.11	-.23	-.02	-.13
VAS Global Severity	.52**	-.21	-.31	-.17	.42*	-.36*
VASGAS (physician)	.49**	-.21	-.28	-.18	.52**	-.44*
TPS (physician)	.27	.06	-.24	-.04	.37*	-.30
MHAQ – Difficulty	.20	-.32	-.71**	-.30	.27	.02
MHAQ – Satisfaction	.26	-.24	-.61**	-.25	.32	-.29
MHAQ – Change	.01	-.02	-.23	-.03	.14	.10
GSI	-.30	.38*	.39*	.13	-.34	.06

VAS = Visual Analogue Scale, GAS = Global Assessment Score, TPS = Tender Point Score, MHAQ = Modified Health Assessment Questionnaire, GSI = Global Subjective Improvement, SE = Self Efficacy, PRSS = Pain-Related Self-Statements.

\* $p < .05$ , \*\* $p < .01$ .

Table 1 shows significant positive correlations between Helplessness and VAS Pain ( $r = .39$ ;  $p < .05$ ), VAS Global Severity ( $r = .52$ ;  $p < .01$ ), and VAS GAS ( $r = .49$ ;  $p < .01$ ), indicating that patients who reported higher levels of helplessness experienced more severe pain, and a higher global severity of symptoms as rated by themselves (VAS Global Severity) and the physician (VAS GAS).

Significant negative correlations were found between SE Pain and VAS Pain ( $r = -.45$ ;  $p < .05$ ) and GSI ( $r = .38$ ;  $p < .05$ ), indicating that patients with higher levels of self-efficacy for managing their pain experienced less physical pain, and also reported that their illness showed improvement after treatment. Significant negative correlations were found for SE Function and MHAQ-Difficulty ( $r = -.71$ ;  $p < .01$ ) and MHAQ-Satisfaction ( $r = -.61$ ;  $p < .01$ ), indicating that patients with higher levels of self-efficacy regarding their functioning experienced activities of daily living as less difficult and were more satisfied with their ability to execute tasks. SE Function and GSI ( $r = .39$ ;  $p < .05$ ) showed a positive correlation, indicating that patients with higher levels of self-efficacy regarding their functioning reported that their illness have improved since receiving treatment. No significant correlations were found between SE Symptom and any of the functional status measures.

Significant positive correlations were found between PRSS Factor 1 (Catastrophizing) and VAS Pain ( $r = .36$ ;  $p < .05$ ), VAS Global Severity ( $r = .42$ ;  $p < .05$ ), VAS GAS ( $r = .52$ ;  $p < .01$ ) and TPS ( $r = .37$ ;  $p < .05$ ). This indicated that patients who reported less pain and global symptom severity showed less catastrophizing, and the higher the levels of patients' catastrophizing, the higher was the physician's rating of symptom severity and TPS examination. Significant negative correlations were found between PRSS Factor 2 (Active Coping), VAS Global Severity ( $r = .36$ ;  $p < .05$ ) and VAS GAS ( $r = .44$ ;  $p < .05$ ), indicating more active coping abilities by patients that reported and presented with less global symptom severity.



Table 2

Pearson Correlations between Functional Status Measures and Scores on the Quality of Social Support Scale (QSSS)

Functional Status Measures	Psychological Variables						
	QSSS Total	QSSS Task	QSSS Relation	QSSS Ego	QSSS Physical	QSSS Info	QSSS Opportu
VAS Pain	.13	.20	-.21	-.03	.10	-.01	.27
VAS Fatigue	.40**	.35	-.22	.25	.32	.07	.52**
VAS Sleep	.04	-.06	.09	-.11	-.03	.23	.06
VAS Global Severity	-.05	.03	-.16	-.07	.03	-.07	-.02
VAS GAS (physician)	-.05	.03	-.26	-.19	-.05	-.10	.25
TPS (physician)	.13	.08	-.15	-.16	.11	.10	.38*
MHAQ – Difficulty	-.18	.17	-.52**	-.47	-.17	.07	-.13
MHAQ – Satisfaction	-.29	.02	-.39*	-.44*	-.25	-.07	-.21
MHAQ – Change	-.10	-.22	-.11	-.40*	.03	.23	.11
GSI	.22	.08	.26	.21	-.03	.26	.10

VAS = Visual Analogue Scale, GAS = Global Assessment Score, TPS = Tender Point Score, MHAQ = Modified Health Assessment Questionnaire, GSI = Global Subjective Improvement, QSSS = Quality of Social Support Scale.

\* $p < .05$ , \*\* $p < .01$ .

Table 2 showed a significant positive correlation between QSSS Total and VAS Fatigue ( $r = .40$ ;  $p < .01$ ), indicating that patients who experienced more support from their family members and friends reported more fatigue. Significant negative correlations were found between Relationship Strain (QSSS), and MHAQ-Difficulty ( $r = -.52$ ;  $p < .01$ ) and MHAQ-Satisfaction ( $r = -.39$ ;  $p < .05$ ). Higher levels of relationship strain between patients and their significant others were thus associated with less functional difficulty and with feelings of satisfaction with the ability to execute certain tasks. Significant negative correlations were found between QSSS-subscale of Ego Support or Affirmation, and MHAQ-Satisfaction ( $r = -.44$ ;  $p < .05$ ) and MHAQ-Change ( $r = -.40$ ;  $p < .05$ ). Patients who perceived more ego support and affirmation from significant others, had less difficulty and was more satisfied with their ability to perform certain tasks. The significant positive correlations between the

QSSS-subscale, Opportunity for Confiding, and VAS Fatigue ( $r = .52$ ;  $p < .01$ ) and TPS ( $r = .38$ ;  $p < .05$ ) indicated that patients who had more opportunity to confide in significant others, reported higher levels of fatigue and had more tender points on the day of examination. No significant correlations were found between VAS Sleep and any of the psychological measures.

Table 3

Pearson Correlations between the Psychological Variables of Helplessness, Self-Efficacy, Quality of Social Support and Pain-Related Self-Statements

Psychological Variables	Psychological Variables												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Helplessness	-	-.47**	-.38*	-.20	-.28	.07	-.35	-.17	-.17	-.32	-.32	.72**	-.33
2. SE Pain		-	.47**	.62**	.24	-.02	.35	.19	.21	.12	.26	-.36*	.20
3. SE Function			-	.41*	.10	-.15	.36*	.37*	.13	-.07	.04	-.36*	.07
4. SE Symptoms				-	.36*	.19	.32	.29	.40*	.12	.15	-.38*	.25
5. QSSS Total					-	.75**	.14	.75**	.76**	.57**	.62**	-.29	.16
6. QSSS Task						-	-.27	.58**	.62**	.15	.29	-.10	.07
7. QSSS Relation							-	.21	-.00	.17	-.01	-.47**	.11
8. QSSS Ego								-	.66**	.19	.19	-.20	-.09
9. QSSS Physical									-	.16	.32	-.21	.21
10. QSSS Info										-	.45*	-.20	.20
11. QSSS Opportu											-	-.09	.11
12. PRSS Factor1												-	-.46**
13. PRSS Factor2													-

SE = Self Efficacy, QSSS = Quality of Social Support Scale, PRSS = Pain-Related Self-Statements.  
\* $p < .05$ , \*\* $p < .01$ .

Table 3 shows correlations between the psychological measures used in the study. Significant negative correlations were found between Helplessness and SE Pain ( $r = -.47$ ;  $p < .01$ ) and SE Function ( $r = -.38$ ;  $p < .05$ ), indicating that patients who reported higher levels of helplessness had less self-efficacy to manage their pain and execute daily activities. A significantly strong positive correlation was found between Helplessness and PRSS Factor 1 (Catastrophizing) ( $r = .72$ ;  $p < .01$ ),



suggesting that patients who reported high levels of helplessness also reported high levels of catastrophizing.

Strong internal consistency was found with the Self-Efficacy Scale, as significant positive correlations were shown between all three subscales: SE Pain ( $r = .47$ ;  $p < .01$  and  $r = .62$ ;  $p < .01$ ), SE Function ( $r = .47$ ;  $p < .01$  and  $r = .41$ ;  $p < .05$ ), and SE Symptoms ( $r = .62$ ;  $p < .01$  and  $r = .41$ ;  $p < .05$ ). Significant negative correlations were found between all three SE-subscales and PRSS Factor 1 (Catastrophizing): SE Pain ( $r = -.36$ ;  $p < .05$ ), SE Function ( $r = -.36$ ;  $p < .05$ ) and SE Symptoms ( $r = -.38$ ;  $p < .05$ ), indicating that patients with lower self-efficacy present with higher levels of catastrophizing. SE Function had significant positive correlations with QSSS Relationship Strain ( $r = .36$ ;  $p < .05$ ) and QSSS Ego Support ( $r = .37$ ;  $p < .05$ ), and SE Symptoms had significant positive correlations with QSSS Total ( $r = .36$ ;  $p < .05$ ) and QSSS Physical Affection ( $r = .40$ ;  $p < .05$ ). Patients' perceived self-efficacy to perform activities of daily living was lower when they experienced less strain in relationships and received less affirmation. Patients' perceived self-efficacy to manage other fibromyalgia symptoms was lower when they experienced less support and physical affection from significant others in their lives.

Except for Relationship Strain, QSSS Total showed strong internal consistency with all its subscales: Task Assistance ( $r = .75$ ;  $p < .01$ ), Physical Affection ( $r = .76$ ;  $p < .01$ ), Ego Support ( $r = .75$ ;  $p < .01$ ), Information and Feedback ( $r = .57$ ;  $p < .01$ ) and Opportunity for Confiding ( $r = .62$ ;  $p < .01$ ). The Relationship Strain subscale had a significant negative correlation with PRSS Factor 1 (Catastrophizing) ( $r = -.47$ ;  $p < .01$ ), indicating less catastrophizing tendencies in patients who experienced more strain in their relationships. A significant negative correlation between PRSS Factor 1 (Catastrophizing) and PRSS Factor 2 (Active Coping) ( $r = -.46$ ;  $p < .01$ ) indicated that

patients who engaged with active coping styles also had less tendency to catastrophize about their illness.

Table 4

Pearson Correlations between the Functional Status Measures: VAS Pain, VAS Fatigue, VAS Sleep, VAS Global Severity, VAS GAS, TPS, MHAQ – Difficulty, MHAQ – Satisfaction, MHAQ – Change, and GSI

Functional Status Measures	Functional Status Measures									
	1	2	3	4	5	6	7	8	9	10
1. VAS Pain	-	.63**	-.20	.54**	.70**	.48**	.26	.24	.28	-.49**
2. VAS Fatigue		-	.08	.50**	.67**	.55**	.18	.24	.06	-.13
3. VAS Sleep			-	.27	.21	.23	.08	.21	.13	.31
4. VAS Global				-	.77	.62**	.20	.29	.06	-.06
5. VAS GAS					-	.78**	.32	.45*	.26	-.25
6. TPS						-	.17	.27	.37	-.04
7. MHAQ (Difficulty)							-	.81**	.36*	-.42*
8. MHAQ (Satisfaction)								-	.50**	-.38*
9. MHAQ (Change)									-	-.41*
10. GSI										-

VAS = Visual Analogue Scale, GAS = Global Assessment Score, TPS = Tender Point Score, MHAQ = Modified Health Assessment Questionnaire, GSI = Global Subjective Improvement. \* $p < .05$ , \*\* $p < .01$ .

The VAS Pain measure showed significant positive correlations with VAS Fatigue ( $r = .63$ ;  $p < .01$ ), VAS Global Severity ( $r = .54$ ;  $p < .01$ ), VAS GAS ( $r = .70$ ;  $p < .01$ ) and TPS ( $r = .48$ ;  $p < .01$ ), indicating that patients with higher pain levels also experienced more fatigue, a higher global severity of symptoms, poor global functioning as assessed by the physician, and more tender points on examination. VAS Pain had a significant negative correlation with GSI ( $r = -.49$ ;  $p < .01$ ), indicating more improvement reported by patients who experienced less pain. Significantly strong positive correlations were found between VAS Fatigue and VAS Global Severity ( $r = .50$ ;  $p < .01$ ), VAS GAS ( $r = .67$ ;  $p < .01$ ), and TPS ( $r = .55$ ;  $p < .01$ ). Thus, patients with higher fatigue levels



experienced more global severity of their illness, a poor physician's rating concerning their global functioning and a higher tender point score. Significant positive correlations were found between TPS, VAS Global ( $r = .62$ ;  $p < .01$ ), and VAS GAS ( $r = .78$ ;  $p < .01$ ), showing the level of subjective and objective global severity to increase with the number of tender points. No significant correlations were found on the VAS Sleep measure.

Strong internal consistency was found for the MHAQ, as all three subscales correlated significantly with each other. GSI had significant negative correlations with all three MHAQ subscales (Difficulty, Satisfaction and Change), indicating less functional difficulty, more satisfaction and more change to be associated with subjective improvement after treatment. The MHAQ Satisfaction subscale had a significant positive correlation with VAS GAS ( $r = .45$ ;  $p < .05$ ), indicating a poor rating on patient functioning by the physician when a patient was dissatisfied with his or her ability to do certain tasks.

## 5. DISCUSSION

It was initially planned to divide the patients into responders and nonresponders to treatment, and to compare these two groups in terms of the psychological variables. For this purpose the preliminary response criteria developed by Simms, et al. (1991) were used. These criteria successfully distinguished between treated and placebo patients, and identified those patients who underwent substantial improvement when conventional outcome measures were used. Thus, on the basis of patients' TPS, VAS for sleep and VAS physician global assessment score, only four responders and six nonresponders out of the total group of 31 patients were identified. Comparison of these two subgroups in terms of psychological variables was not possible, due to the small sizes of the subgroups. However, this result is similar to results from other FMS studies, showing that the low percentage of explained variance may be due to the heterogeneity of fibromyalgia. Additionally, the



small number of responders may suggest that current forms of treatment are not effective for a large portion of the fibromyalgia population (Giesecke, et al., 2003; King, Wessel, Bhambhani, Sholter, & Maksymowych, 2002; Thieme, et al., 2004). Consequently, a correlational approach was used.

Results of the present study indicated significant correlations between patient-administered measures (VAS Pain, Fatigue and Global Severity) and physician's ratings (VAS GAS and TPS), offering support for the VAS as a measure of functional status. The global rating of severity by the patients (VAS Global Severity) and the physician (VAS GAS) correlated positively, as well as with measures of helplessness, catastrophizing and active coping. This indicates that the patient's global severity, as rated by themselves and the physician, was probably mediated by the patient's level of catastrophizing, helplessness and active coping. These findings are in accordance with the results reported by Martin, et al. (1996) that maladaptive coping efforts predict an objective impression and subjective experience of disability in patients with primary fibromyalgia. Cognitive appraisals, such as catastrophizing, active or passive coping, and vigilance to pain have a more pronounced role in the self-reported pain of patients with FMS than in patients with RA and chronic low back pain (Crombez, Eccleston, Van Den Broeck, Goubert, & Van Houdenhove, 2004; Hassett, Cone, Patella, & Sigal, 2000). The VAS Sleep measure showed no correlation with any functional status or psychological measures. The use of low dose tricyclic antidepressants used by more than half the sample may account for this result.

Contrary to what was expected, self-reported VAS Fatigue increased with the total amount of perceived social support as well as the opportunity available for confiding in family or friends. Similarly, patients perceived more relationship strain when they showed lower levels of catastrophizing, higher levels of self-efficacy to function, and less difficulty and more satisfaction in managing their daily activities. The presence of relationship strain did not predict greater reports of



pain, lower self-efficacy and perceived unimprovement as found by Turk, Kerns, & Rosenberg (1992), and neither was more support from others associated with less fatigue in patients. A possible explanation may be found in the overt pain behaviours displayed by patients. Pain behaviours (i.e. overt expressions of pain) are observable and have the potential to elicit responses from others. These responses of significant others may serve as reinforcers of pain behaviours and may lead to increased expression of the initial behaviours even in the absence of physical symptomatology. The important role of reinforcement on the maintenance of pain behaviours has been reported in several studies (Romano, et al., 1995; Turk & Ellis, 2003; Turk, Kerns, & Rosenberg, 1992). Patients are not intentionally being manipulative, but through conditioning, anticipated consequences may come to control their behaviour. Family members who react with undesired responses such as skepticism or criticism to a patient's fatigue and pain behaviours may condition a patient to deny or minimize his or her true experience of pain and fatigue. The patient may then ignore his or her symptoms and may overdo activities, experiencing increased symptomatology, as well as conflict, withdrawal, or other additional distress (Turk & Ellis, 2003).

The strong positive correlation between helplessness and the cognitive appraisal of catastrophizing may be indicative of a possible mediating relationship between these two variables. Little, if any studies have been published where both constructs were examined. Path analytic procedures revealed that helplessness fully mediated the effects of pain on self-reported pain behaviour (Nicassio, et al., 1999). Further studies on catastrophizing in FMS might aid with an understanding of its mediational capacities, if any, and its relationship to helplessness. Two points of departure may be considered: (a) the uncertainty regarding the cause, treatment and outcome of FMS may contribute to considerable subjective anxiety, passive resignation and other forms of dysfunctional coping behaviour (e.g. helplessness; catastrophizing) in FMS patients, and (b) feelings of isolation

experienced by patients due to significant others' and/or clinicians' lack of understanding of their difficulties to cope with FMS may result in extreme overt expression of pain and other dysfunctional behaviours (e.g. helplessness and catastrophizing).

The negative association between all three subscales of the Arthritis Self-Efficacy Scale and PRSS Catastrophizing-subscale could be partially explained by findings on chronic fatigue syndrome (CFS). Findley, Kerns, Weinberg and Rosenberg (1998) concluded that increased coping ability may mediate, or be mediated by, improved self-efficacy expectations, which has also been shown to be a moderator, for example, of CFS symptoms. In the present study, self-efficacy tended to increase when patients displayed less catastrophizing. Increased pain behaviours have been associated with higher levels of depression, greater satisfaction with social support, reduced self-efficacy for control of pain, and more negative thoughts (Keefe, Wilkins, Cook, Crisson, & Muhlbaier, 1986).

There are a number of limitations that may have influenced the results of the present study. It was conducted with patients being regularly seen at a medical center, and thus who may have more severe symptoms. In addition, the median duration of disease was 4.90 years, indicating that the patients had an established rather than early disease. As no control group was used, it cannot be concluded that these results are specific to FMS.



### References

- Ahles, T.A., Khan, S.A., Yunus, M.B., Spiegel, D.A., & Masi, A.T. (1991). Psychiatric status of patients with primary fibromyalgia, patients with rheumatoid arthritis, and subjects without pain: A blind comparison of DSM – III diagnosis. *American Journal of Psychiatry*, 148, 1721-1726.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- Biedermann, H.J., McGhie, A., Monga, T.N., & Shaks, G.L. (1987). Perceived and actual control in EMG treatment of back pain. *Behaviour Research and Therapy*, 25, 137-147.
- Bigatti, S., & Cronan, T.A. (2002). A comparison of pain measures used with patients with fibromyalgia. *Journal of Nursing Measurement*, 10, 5-14.
- Bradley, L.A. (1989). Cognitive behavioural therapy for primary fibromyalgia. *Journal of Rheumatology*, 18, 72-75.
- Brown, G.K., & Nicassio, P.M. (1987). Development of a questionnaire for the assessment of active and passive coping strategies in chronic pain patients. *Pain*, 31, 53-64.
- Buckelew, S.P., Conway, R., Parker, J., Deuser, W.E., Read, J., Witty, T.E., Hewett, J.E., Minor, M., Johnson, J.C., Van Male, L., McIntosh, M.J., Nigh, M., & Kay, D.R. (1998). Biofeedback/relaxation training and exercise interventions for fibromyalgia: A prospective trial. *Arthritis Care and Research*, 11, 196-209.
- Buckelew, S.P., Murray, S.E., Hewett, J.E., Johnson, J., & Huyser, B. (1995). Self-efficacy, pain, and physical activity among fibromyalgia subjects. *Arthritis Care and Research*, 8, 43-50.

- Buckelew, S.P., Parker, J.C., Keefe, F.J., Deuser, W.E., Crews, T.M., Conway, R., Kay, D.R., Hewett, J.E. (1994). Self-efficacy and pain behavior among subjects with fibromyalgia. *Pain*, 59, 377-384.
- Burckhardt, C.S., Clark, S.R., & Bennett, R.M. (1993). Fibromyalgia and quality of life: A comparative analysis. *Journal of Rheumatology*, 20, 475-479.
- Burckhardt, C.S., Mannerkorpi, K., Hedenberg, L., & Bjelle, A. (1994). A randomized, controlled clinical trial of education and physical training for women with fibromyalgia. *Journal of Rheumatology*, 21, 714-720.
- Carette, S., Bell, M.J., Reynolds, W.J., Haraoui, B., McCain, G.A., Bykerk, V.P., Edworthy, S.M., Baron, M., Koehler, B.E., Fam, A.G., Bellamy, N., & Guimont, C. (1994). Comparison of amitriptyline, cyclobenzaprine, and placebo in the treatment of fibromyalgia: A randomized, double-blind clinical trial. *Arthritis and Rheumatism*, 37, 32-40.
- Crombez, G., Eccleston, C., Van den Broeck, A., Goubert, L., & Van Houdenhove, B. (2004). Hypervigilance to pain in fibromyalgia: The mediating role of pain intensity and catastrophic thinking about pain. *Clinical Journal of Pain*, 20, 98-102.
- Dailey, P.A., Bishop, G.D., Russell, I.J., & Fletcher, E.M. (1990). Psychological stress and the fibrositis/fibromyalgia syndrome. *Journal of Rheumatology*, 17, 1380-1385.
- Dauvilliers, Y., & Touchon, J. (2003). Musculoskeletal pain, fibromyalgia, and sleep. *Douleur et Analgesie*, 16, 117-124.
- DeVellis, R.F., & Callahan, L.F. (1993). A brief measure of helplessness in rheumatic disease: The helplessness subscale of the Rheumatology Attitudes Index. *Journal of Rheumatology*, 20, 866-900.



Findley, J.C., Kerns, R., Weinberg, L.D., & Rosenberg, R. (1998). Self-efficacy as a psychological moderator of Chronic Fatigue Syndrome (CFS). *Journal of Behaviour and Medicine, 21*, 351-362.

Flor, H., Behle, D. J., & Birbaumer, N. (1993). Assessment of chronic pain-related cognitions in chronic pain patients. *Behavioral Research and Therapy, 31*, 63-73.

Franks, H.M., Cronan, T.A., & Oliver, K. (2004). Social support in women with fibromyalgia: Is quality more important than quantity? *Journal of Community Psychology, 32*, 425-438.

Fries, J.F., Spitz, P., Kraines, R.G., & Holman, H.R. (1980). Measurement of patient outcomes in arthritis. *Arthritis and Rheumatism, 23*, 137-145.

Giesecke, T., Williams, D.A., Harris, R.E., Cupps, T.R., Tian, X., Tian, T.X., Gracely, R.H., & Clauw, D.J. (2003). Subgrouping of fibromyalgia patients on the basis of pressure-pain thresholds and psychological factors. *Arthritis and Rheumatism, 48*, 2916-2922.

Goldenberg, D.L. (1993). Fibromyalgia: Treatment programs. *Journal of Musculoskeletal Pain, 1*, 71-81.

Goldenberg, D.L., Burckhardt, C., & Crofford, L. (2004). Management of fibromyalgia syndrome. *Journal of the American Medical Association, 292*, 2388-2395.

Goldenberg, D.L., Felson, D.T., & Dinerman, H. (1986). A randomized controlled trial of amitriptyline and naproxen in the treatment of patients with fibromyalgia. *Arthritis and Rheumatism, 29*, 1371-1377.

Goodenow, C., Reisine, S.T., & Grady, K.E. (1990). Quality of social support and associated social and psychological functioning in women with rheumatoid arthritis. *Health Psychology, 9*, 266-284.

Hallberg, L.R.M., & Carlsson, S.G. (1998). Psychosocial vulnerability and maintaining forces related to fibromyalgia: In-depth interviews with twenty-two female patients. *Scandinavian Journal of Caring Sciences*, 12, 95-104.

Hassett, A.L., Cone, J.D., Patella, S.J., & Sigal, L.H. (2000). The role of catastrophizing in the pain and depression of women with fibromyalgia syndrome. *Arthritis and Rheumatism*, 43, 2493-2500.

Horven Wigers, S.H., Stiles, T.C., & Vogel, P.A. (1996). Effects of aerobic exercise versus stress management treatment in fibromyalgia: A 4.5 year prospective study. *Scandinavian Journal of Rheumatology*, 25, 77-86.

Jaeschke, R., Adachi, J., Guyatt, G., Keller, J., & Wong, B. (1991). Clinical usefulness of amitriptyline in fibromyalgia: The results of 23 N-of-1 randomized controlled trials. *Journal of Rheumatology*, 18, 447-451.

Johnson, S.K., DeLuca, J., & Natelson, B.H. (1999). Chronic fatigue syndrome: Reviewing the research findings. *Annals of Behavioral Medicine*, 21, 258-271.

Kaplan, R.M., Schmidt, S.M., & Cronan, T.A. (2000). Quality of well-being in patients with fibromyalgia. *Journal of Rheumatology*, 27, 785-789.

Keefe, F.J., Wilkins, R.H., Cook, W.A., Crisson, J.E., & Muhlbaier, L.H. (1986). Depression, pain, and pain behavior. *Journal of Consulting and Clinical Psychology*, 54, 665-669.

Keel, P.J., Bodoky, C., Gerhard, U., & Muller, W. (1998). Comparison of intergrated group therapy and group relaxation training for fibromyalgia. *The Clinical Journal of Pain*, 14, 232-238.



King, S.J., Wessel, J., Bhambhani, Y., Sholter, D., & Maksymowych, W. (2002). Predictors of success of intervention programs for persons with fibromyalgia. *Journal of Rheumatology*, 29, 1034-1040.

Lackner, S.L. (2000). Chronic illness and social support: Understanding interaction. *Dissertation Abstracts International*, 60(7-A), 2693.

Lorig, K., Chastam, R. L., Ung, E., Shoor, S., & Holman, H. R. (1989). Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. *Arthritis and Rheumatism*, 32, 37-44.

Lynch, G.V. (2004). Patient variables associated with treatment completion in a mindfulness meditation-based stress reduction (MBSR) treatment for fibromyalgia: Implications for prescriptive matching and participation enhancement. *Dissertation Abstracts International*, 65(5-B), 2635.

Martin, M.Y., Bradley, L.A., Alexander, R.W., Alarcon, G.S., Trianca-Alexander, M., Aaron, L.A., & Alberts, K.R. (1996). Coping strategies predict disability in patients with primary fibromyalgia. *Pain*, 68, 45-53.

Mueller, A., Hartmann, M., Mueller, K., & Eich, W. (2003). Validation of the Arthritis Self-Efficacy Short-form Scale in German fibromyalgia patients. *European Journal of Pain*, 7, 163-171).

Nicassio, P.M., Radojevic, V., Weisman, M.H., Schuman, C., Kim, J., Schoenfeld-Smith, K., & Krall, T. (1997). Comparison of behavioral and educational interventions for fibromyalgia. *Journal of Rheumatology*, 24, 2000-2007.

Nicassio, P.M., Schuman, C., Kim, J., Cordova, A., & Weisman, M.H. (1997). Psychosocial factors associated with complementary treatment use in fibromyalgia. *Journal of Rheumatology*, 24, 2008-2013.

Nicassio, P.M., Schuman, C., Radojevic, V., & Weisman, M.H. (1999). Helplessness as a mediator of health status in fibromyalgia. *Cognitive Therapy and Research*, 23, 181-196.

Nicassio, P.M., Wallston, K.A., Callahan, L.F., Herbert, M., & Pincus, T. (1985). The measurement of helplessness in rheumatoid arthritis: The development of the Arthritis Helplessness Index. *Journal of Rheumatology*, 12, 462-467.

Newton, C.R., & Barbaree, H.E. (1987). Cognitive changes accompanying headache treatment: The use of a thought-sampling procedure. *Cognitive Therapy and Research*, 11, 635-652.

Nezu, A.M., Nezu, C.M., & Lombardo, E.R. (2001). Cognitive-behavior therapy for medically unexplained symptoms: A critical review of the treatment literature. *Behavior Therapy*, 32, 537-583.

Peterson, C. (1982). Learned helplessness and health psychology. *Health Psychology*, 1, 53-68.

Phillips, H.C. (1987). Avoidance behaviour and its role in sustaining chronic pain. *Behaviour Research and Therapy*, 25, 273-279.

Pincus, T., Summey, J.A., Soraci, S.A., Wallston, K.A., & Hummon, N.P. (1983). Assessment of patient satisfaction in activities of daily living using a modified Stanford Health Assessment Questionnaire. *Arthritis and Rheumatism*, 26, 1346-1453.

Price, D.D., McGrath, P.A., Rafii, A., & Buckingham, B. (1983). The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. *Pain*, 17, 45-65.



- Prince, A., Bernard, A.L., & Edsall, P.A. (2000). A descriptive analysis of fibromyalgia from the patients' perspective. *Journal of Musculoskeletal Pain*, 8, 35-47.
- Reisine, S., Fifield, J., Walsh, S.J., & Feinn, R. (2003). Do employment and family work affect the health status of women with fibromyalgia? *Journal of Rheumatology*, 30, 2045-2053.
- Romano, J.M., Turner, J.A., Jensen, M.P., Friedman, L.S., Bulcroft, R.A., & Hops, H. (1995). Chronic pain patient: Spouse behavioural interaction predict disability. *Pain*, 63, 353-360.
- Rudnicki, S.R. (2001). A model of psychosocial factors and pain in fibromyalgia: An integrative approach. *Dissertation Abstracts International*, 62(2-B), 1098.
- Santadrea, S., Montrone, F., Sarzi-Puttni, P., Boccassini, L., & Caruso, I. (1993). A double-blind crossover study of two cyclobenzaprine regimens in primary fibromyalgia syndrome. *Journal of Internal Medicine Research*, 21, 74-80.
- Sarnoch, H., Adler, F., & Scholz, O.B. (1997). Relevance of muscular sensitivity, muscular activity, and cognitive variables for pain reduction associated with EMG biofeedback in fibromyalgia. *Perceptual and Motor Skills*, 84, 1043-1050.
- Savelkoul, M., Post, M.W.M., De Witte, L.P., & Van Den Borne, H.B. (2000). Social support, coping, and subjective well-being in patients with rheumatic diseases. *Patient Education and Counseling*, 39, 205-218.
- Schochat, T., Croft, P., & Raspe, H. (1994). The epidemiology of fibromyalgia. *British Journal of Rheumatology*, 33, 783-786.
- Schoenfeld-Smith K., Nicassio P.M., Radojevic V., & Patterson T.L. (1995). Multiaxial taxonomy of fibromyalgia syndrome patients. *Journal of Clinical Psychology in Medical Settings*, 2, 149-166.
- Scott, J., & Huskisson, E.C. (1976). Graphic representation of pain. *Pain*, 2, 175-184.

Scudds, R.A., McCain, G.A., Rollman, G.B., & Harth, M. (1989). Improvement in pain responsiveness in patients with fibrositis after successful treatment with amitriptyline. *Journal of Rheumatology*, 19, 98-103.

Simms, R.W., Felson, D.T., & Goldenberg, D.L. (1991). Development of preliminary criteria for response to treatment in fibromyalgia syndrome. *Journal of Rheumatology*, 18, 1558-1563.

Stein, M.J., Wallston, K.A., Nicassio, P.M., & Castner, N. (1988). Correlates of a clinical classification schema for the Arthritis Helplessness Subscale. *Arthritis and Rheumatism*, 31, 876-881.

Tayer, W.T., Nicassio, P.M., Radojevic, V., & Krall, T. (1996). Pain and helplessness as correlates of depression in systemic lupus erythematosus. *British Journal of Health Psychology*, 1, 253-262.

Thieme, K., Turk, D.C., & Flor, H. (2004). Comorbid depression and anxiety in fibromyalgia syndrome: Relationship to somatic and psychosocial variables. *Psychosomatic Medicine*, 66, 837-844.

Turk, D.C., & Ellis, B. (2003). Pain and fatigue. *Handbook of chronic fatigue syndrome and other fatiguing illnesses*, pp. 211-244, Hoboken, NJ: Wiley.

Turk, D.C., Kerns, R.D., & Rosenberg, R. (1992). Effects of marital interaction on chronic pain and disability: Examining the downside of social support. *Rehabilitation Psychology*, 37, 259-274.

Turk, D.C., Okifuji, A., Sinclair, J.D., & Starz, T.W. (1998). Interdisciplinary treatment for fibromyalgia syndrome: Clinical and statistical significance. *Arthritis Care and Research*, 11, 186-195.



Uvegas, J.M., Parker, J.C., Smarr, K.L., McGowen, J.F., Lyon, M.G., Irvin, W.S., Meyer, A.A., Buckelew, S.P., Morgan, R.K., & Delmonico, R.L. (1990). Psychological symptoms in primary fibromyalgia syndrome: Relationship to pain, life stress, and sleep disturbance. *Arthritis and Rheumatism*, 33, 1279-1283.

White, K.P., & Harth, M. (1996). An analytical review of 24 controlled clinical trials for fibromyalgia syndrome (FMS). *Pain*, 64, 211-219.

White, K.P., Speechley, M., Harth, M., & Østbye, T. (1995). Fibromyalgia in rheumatology practice: A survey of Canadian rheumatologists. *Journal of Rheumatology*, 22, 722-726.

Winfield, J.B. (1999). Pain in fibromyalgia. *Rheumatic Disease Clinics of North America*, 25, 55-79.

Wolfe, F. (1993). The epidemiology of fibromyalgia. *Journal of Musculoskeletal Pain*, 1, 137-148.

Wolfe, F., Anderson, J., Harkness, D., Bennett, R.M., Caro, X.J., Goldenberg, D.L., Russell, I.J., & Yunus, M.B. (1997). Health status and disease severity in fibromyalgia: Results of a six-center longitudinal study. *Arthritis and Rheumatism*, 40, 1571-1579.

Wolfe, F., Smythe, H.A., Yunus, M.B., Bennett, R.M., Bombardier, C., Goldenberg, D.L., Tugwell, P., Campbell, S.M., Abeles, M., Clark, P., Fam, A.G., Farber, S.J., Fiechtner, J.J., Franklin, C.M., Gatter, R.A., Hamaty, D., Lessard, J., Lichtbroun, A.S., Masi, A.T., McCain, G.A., Reynolds, W.J., Romano, T.J., Russell, I.J., & Sheon, R.P. (1990). The American College of Rheumatology 1990 criteria for the classification of fibromyalgia: Report of the Multicenter Criteria Committee. *Arthritis and Rheumatism*, 33, 160-172.